

Virtuoso Infotech Pvt. Ltd.



About Virtuoso Infotech

- Fastest growing IT firm; Offers the flexibility of a small firm and robustness of over 30 years experience collectively within the leadership team
- Technology expertise & passionate team
- Successful client engagements across India, USA, UK, Australia and Argentina
- Handle enterprise solutions that involve **30,000 active users**, more than 20 servers, **data volume as big as 5 million entries per day**

Technological Advances in Healthcare



- Bhargav Mehta

Agenda

- Introduction to how technology is affecting the healthcare domain
- Artificial Intelligence
- IoT - Health Monitoring and Assistance
- Augmented Reality
- Artificial Organs
- Minimally Invasive Surgeries

Introduction

- With advancements in technology, the sector which has seen the most advancements is Healthcare.
- Precision and Accuracy.
- From Curing to Caring.
- Decentralization, treatment at home.
- Organized, Automated, Integrated and Complete.
- Real Time.

Artificial Intelligence

- Using algorithm, data patterns and machine learning we can analyze relationships between prevention or treatment techniques and outcomes.
- Used for diagnosis, targeting, medications, monitoring to post-recovery care.
- It will be helpful in determining chronic and life threatening diseases where trained doctors are less.
- Getting the diagnosis early can almost always help in the treatment. With AI the diagnosis can be non-invasive and routine.
- AI can also help in predicting other major events such as patient's likeliness of getting better, time for recovery and chances of patient to get sick again.

Artificial Intelligence

- Main advantage the AI has in pre or early determination of disease is contextual analysis based on the other data available.
- **Radiology** - study at Stanford which has results presenting that the algorithm that they created can detect Pneumonia better than radiologists.
- **Cancer** - Google's LYNA can be used to pick up cancer cells on tissue images and detect metastatic cancer 99% of the time.
 - An interesting note is that the researchers found that pathologists who worked with LYNA performed better than both pathologists without the tool and the tool used on its own.
- Other companies working extensively on implementations of AI in healthcare are IBM, Microsoft, Apple, Intel etc.

Internet of Things

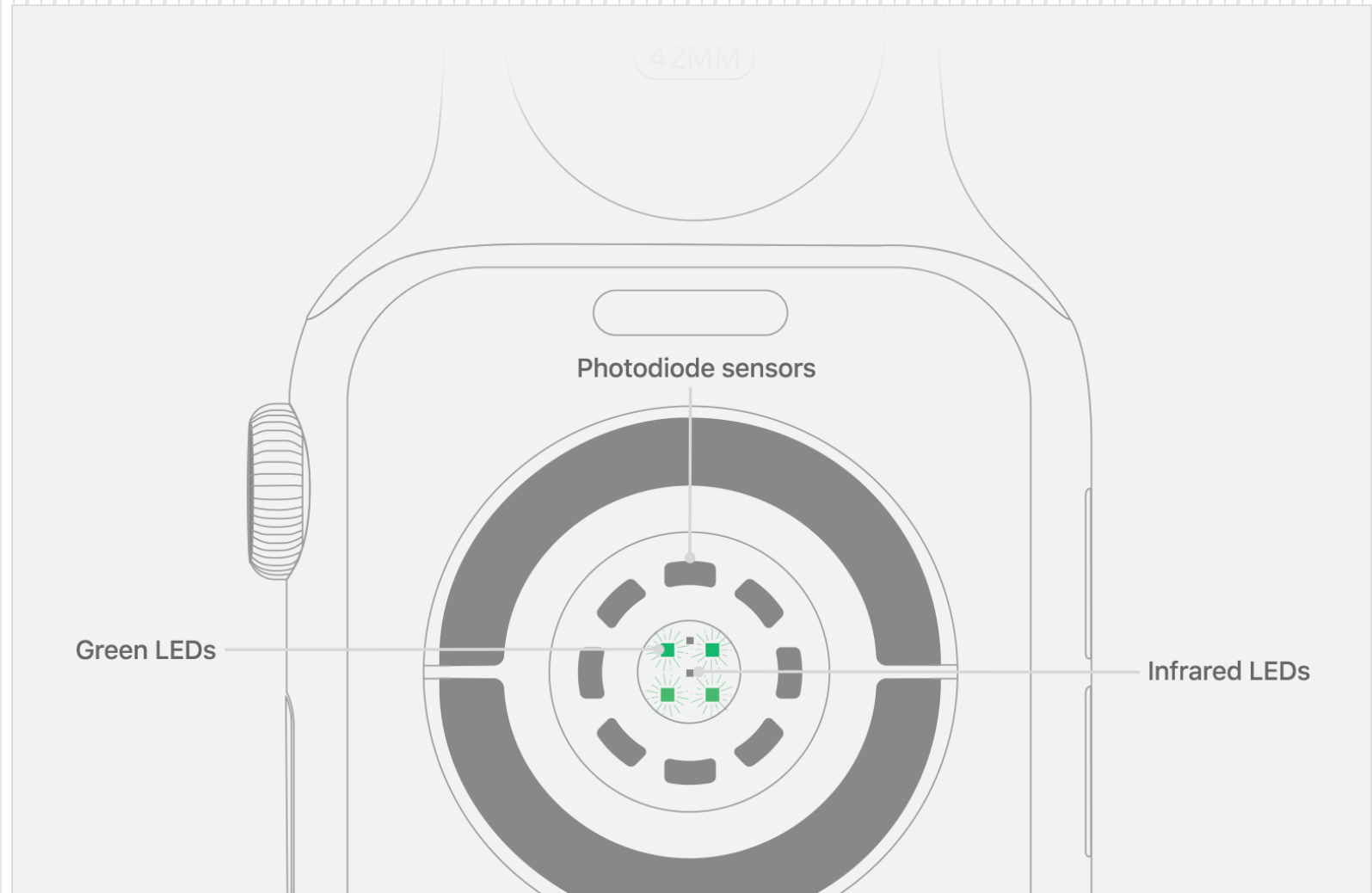
- IoT or Internet of Things implemented for special medical needs is also known as IoMT or Internet of Medical Things.
- We saw advantages that AI proposes in healthcare domain. But for this what is the one core thing that is needed? And where will we get it from?
- Here the IoT or Internet of Things come in to play.
- IoT provides us with immense pool of technology that can help us in improving the healthcare provisions for the patients.
- The most important advantage IoT has is monitoring.

Internet of Things

- It can be of immense help for old age people who are living alone or for people with restricted mobility.
- It can supplant doctor visits and assist them in keeping their necessary vitals in check under real time.
- It can also help in tracking the patterns leading to the event.
- It help in proactive and responsive treatment.
- Above all, it gives a sense of satisfaction, comfort and protection to the user or patient

Sensors

- Heart Rate Sensor
- Light/ Image Sensor
- SQUID

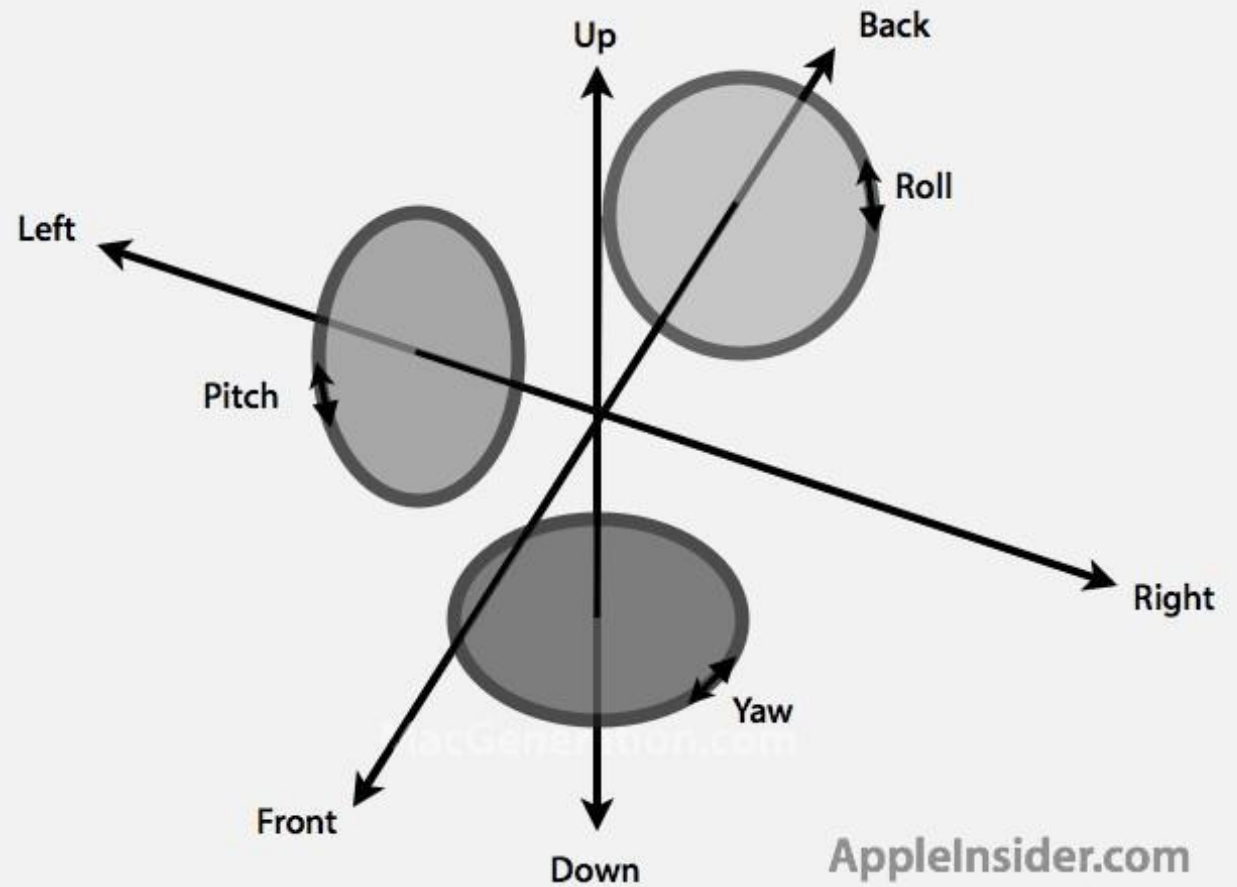


Sensors

- Accelerometers
- Pressure Sensors
- Temperature Sensors

Accelerometers and Gyroscopes

Sense linear and angular acceleration

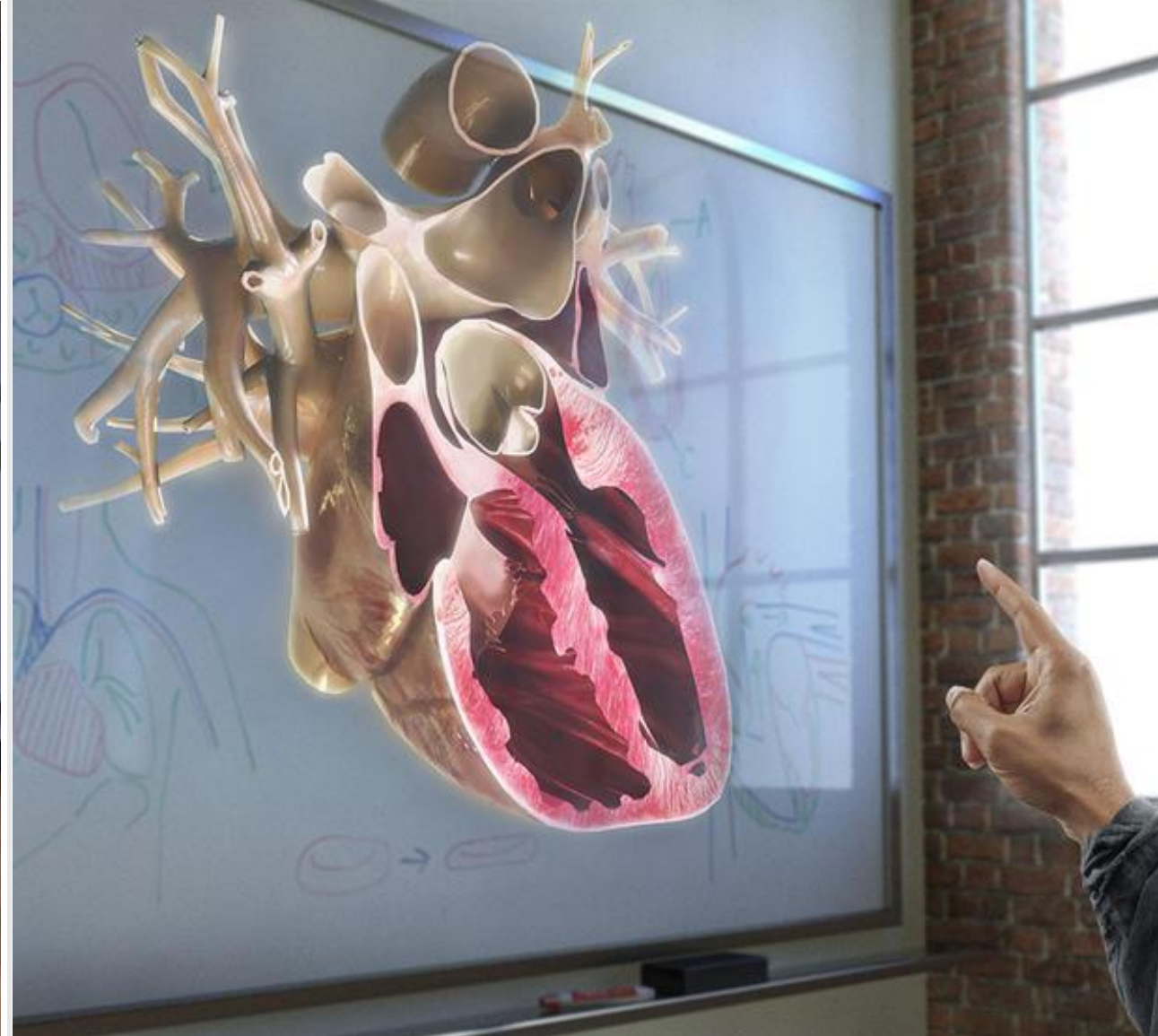
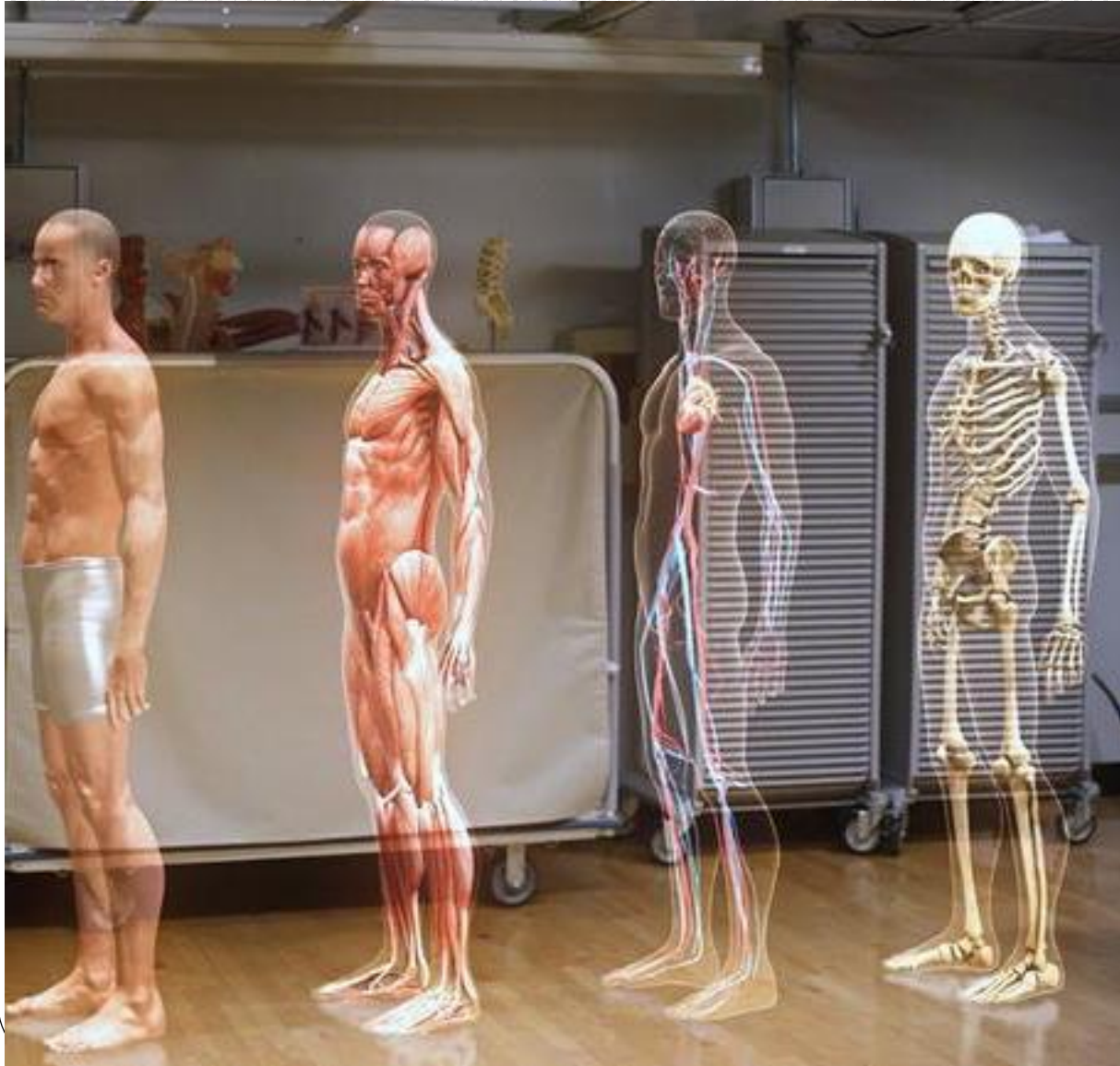


Sensors

➤ BioSensors

- Electrochemical Biosensor
- Blood Glucose Biosensor
- Potentiometric Biosensor
- Immuno–Biosensors

Augmented Reality



Augmented Reality

- Augmented Reality has a major application in learning for healthcare.
- With the help of augmented reality it is possible to easily understand the composition of body and organs.
- It can also help in training of doctors where they can simulate and visualize the surgeries before actually operating.
- It can also help nurses and doctors in pinpointing the exact locations for injections, surgery cuts etc.

Artificial organs

- The most common application of artificial organs is Active Bionic Prosthetics or Artificial Limbs
- Other important artificial organs are
 - Artificial Urinary Bladder
 - Neuroprosthetics [Brain]
 - Cochlear Implant
 - Visual Prosthetics
 - Artificial Heart
 - Artificial Liver
 - Artificial Lungs

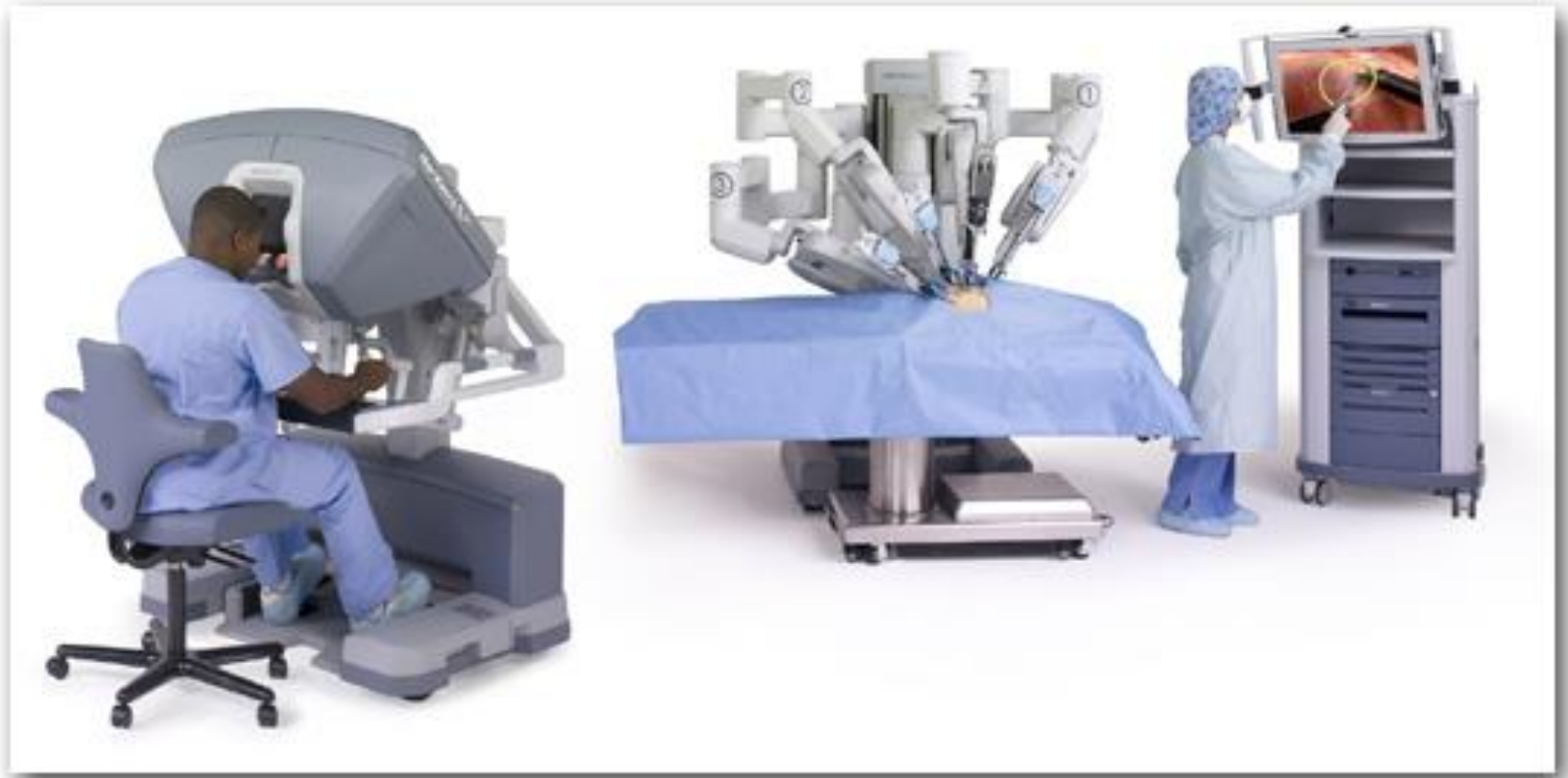
Active Bionic Prosthetics

- Artificial device that replaces a missing body part, which may be lost through trauma, disease, or congenital conditions. Prosthetics are intended to restore the normal functions of the missing body part.
- Neural or Bionic Prosthetics
- The way to control a prosthetic limb is by listening to muscles remaining in the residual limb that the patient can still contract.
- Muscles generate small electrical signals when they contract, so electrodes placed on the surface of the skin can measure muscle movements.

Active Bionic Prosthetics

- Although no buttons are physically pressed by the muscles in this case, their contractions are detected by the electrodes and then used to control the prosthetic limb.
- Prosthetic limbs that function in this way are also called **myoelectric**.

Minimally Invasive Surgeries



Minimally Invasive Surgeries using Robotics

- Advanced robotic systems give doctors greater control and vision during surgery, allowing them to perform safe, less invasive, and precise surgical procedures.
- During robotic-assisted surgery, surgeons operate from a console equipped with two master controllers that maneuver four robotic arms.
- By viewing a high-definition 3-D image on the console, the surgeon is able to see the surgical procedure better than ever before.
- Computer software takes the place of actual hand movements and can make movements very precise.

Minimally Invasive Surgeries using Robotics

- The benefits of minimally invasive robotic surgery can include
 - Small incisions
 - Less pain
 - Low risk of infection
 - Short hospital stay
 - Quick recovery time
 - Less scarring
 - Reduced blood loss
- Not all minimally invasive procedures are completed with robot assistance, and not all medical cases are right for robotic-assisted surgery— some patients may benefit from endoscopic or open (traditional) surgery.

Minimally Invasive Surgeries without Robotics

- Not all minimally invasive procedures are completed with robot assistance — some patients may benefit from endoscopic or open (traditional) surgery.
- Non-robotic minimally invasive surgery is also known as endoscopic surgery. You also may be familiar with terms like laparoscopic surgery, thoracoscopic surgery etc.
- These are minimally invasive procedures that utilize an endoscope to reach internal organs through very small incisions.

Minimally Invasive Surgeries without Robotics

- During endoscopic surgery the surgeon inserts a thin, flexible tube with a video camera through a small incision or a natural orifice like the mouth or nostrils.
- The tube has a channel to utilize tiny surgical instruments, which the surgeon uses while viewing the organs on a computer monitor.
- This technique allows the surgeon to see inside the patient's body and operate through a much smaller incision than would otherwise be required of traditional open surgery.

Thank You!

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